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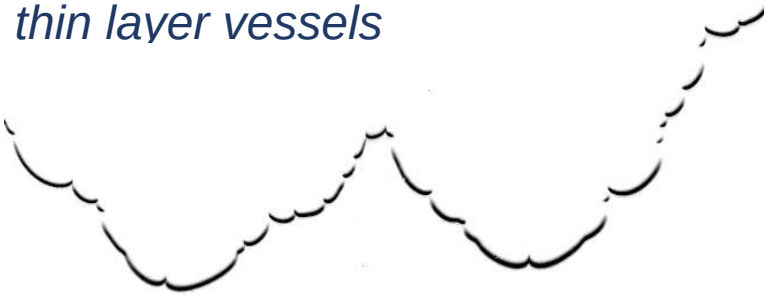
anr agence nationale de la recherche
AU SERVICE DE LA SCIENCE

Postdoc position in Combustion Science

Experimental Hydrogen-air flame study
in thin layer vessels



Available at IRPHE
in **Marseille**, France

Starting date: as soon as possible

Context

In the context of greenhouse gases reduction, intense research is focused on hydrogen, but it rises questions in terms of safety and control. Its wide range of flammability limit and its small quenching distance increase the potential risk of hydrogen leaks. The precise description of the flame propagation is of prime importance, especially in confined environment. In such configurations, the burner walls can have either a damping effect, by absorbing the thermal energy of the flame, or facilitating effect, by imposing distortion and acoustic coupling. As a result, some unexpected flame propagation modes can emerge [1]. The local phenomena at play and the global implication on the dynamics of the whole flame propagation have to be investigated experimentally, in order to draw the limits of potential risk of flame propagation in a defined configuration. A collaboration program recently started between laboratories IRPHE and M2P2 on the propagation of premixed flames in thin layers, with experiments in Hele-Shaw cells[2-3] conducted at IRPHE and numerical simulations conducted at M2P2[4-5]. These laboratories are laureate of an ANR grant to finance the postdoc.

Postdoc description

The Postdoc will consist in developing experimental apparatus for analysis of hydrogen-air flames propagation. Visualization issues will have to be addressed to get both the flame position and the velocity field, in particular close to the walls of the burner. These quantities will give insight into the physical transfer of momentum and energy to the burner's walls. Schlieren techniques will be used to track the global flame shape and speed. LASER Particle Image Velocimetry (PIV) techniques will be adapted to obtain velocity field on a slice of the domain. In addition, the sensitivity of the flame to incoming flow variations and acoustic wave oscillations will be investigated. Small scale description will be facilitated by comparisons with existing numerical simulations made at M2P2.

Conditions

Applicants should hold a PhD in experimental combustion with visualization technique skills, curiosity and motivation to make progress in scientific knowledge. Coding and software development interest are also encouraged.

Duration:	12 to 24 month
Funding:	ANR Agence Nationale pour la Recherche
Employer:	CNRS
Net salary:	more than 2k€ per month.

Email to christophe.almarcha@univ-amu.fr, with CV, cover letter, and references for informations and application.

[1] https://doi.org/10.1103/PhysRevLett.124.174501
[2] https://doi.org/10.1103/APS.DFD.2014.GFM.P0036
[3] https://doi.org/10.1017/jfm.2020.562
[4] https://doi.org/10.1016/j.combustflame.2019.09.029
[5] https://doi.org/10.1016/j.combustflame.2020.07.030

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